Infrasound wave detected on icebreaker SHIRASE

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Atmospheric pressure waves with their predpminant frequency about 0.2 Hz (microbaroms) are induced by oceanic waves. Although the microbaroms have been often observed in inland area away from the coast line, the waves are not well confirmed just above the oceanic swell sources, i.e., on the ships. The microbaroms have been observed at Syowa Station in East Antarctica (Murayama et al., 2015). The infrasound (atmospheric pressure wave with ~20 Hz) sensor was installed on the icebreaker SHIRASE during JARE-54 (54th Japan Antarctic Research Expedition) in 2012 and JARE-55 in 2013 from Fremantle, Western Australia to offshore of the Syowa Station in order to investigate the generation mechanism of the microbaroms. The waves with 0.06-0.2 Hz which was similar frequency range of the microbaroms were observed under the both ways between Australia and Antarctica. However, since the roll and pitch of the ship also had similar frequency range, vertical motion of the sensor on the ship possibly produced artificial waves. In order to evaluate contribution of pressure variation due to the vertical ship motion, we estimated pressure variation associated with the motion using the roll and pitch data. The results show the waves with 0.1-0.2 Hz mainly arise from the ship motion while the wave with 0.06-0.07 Hz were not related to the ship motion. During storm days, which wide frequency range of pressure wave enhanced, even the range around 0.1-0.2 Hz were less related to the ship motion. Further, in contrast, during very calm whether condition, the range around 0.1-0.2 Hz were also less related to the ship motion. The results suggest that the pressure wave with the same frequency range of the microbaroms does not dominate over the sea.

Reference

Murayama, Takahiko, Masaki Kanao, Masa-Yuki Yamamoto, Yoshiaki Ishihara, Takeshi Matshushima and Yoshihiro Kakinami, Infrasound Array Observations in the Lützow-Holm Bay region, East Antarctica, accepted to Polar Science, doi:10.1016/j.polar.2014.07.005, 2015.